

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RONALD A. ASKELAND, MATTHEW D. GIERE,
and SATYA PRAKASH

Appeal 2007-0960
Application 10/066,529
Technology Center 2800

Decided: May 14, 2007

Before JEAN R. HOMERE, JAY P. LUCAS, and JOHN A. JEFFERY,
Administrative Patent Judges.

JEFFERY, *Administrative Patent Judge.*

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 from the Examiner's rejection of claims 3-11, 21, 22, 24, 25, 27, 28, and 30-32, the only claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).

STATEMENT OF THE CASE

Appellants invented a temperature control system for a printhead comprising multiple ink ejection elements. Specifically, a thermal response model and an ejection history of the printhead assembly are stored in memory. Moreover, a controller is configured to estimate an actual temperature of the printhead assembly based on (1) a measured or current operating temperature of the printhead assembly; (2) the thermal response model; and (3) the ejection history of the ejection elements.¹ Claim 24 is illustrative:

24. A printhead temperature control system, comprising:

a printhead assembly having a plurality of ejection elements;

a temperature sensor configured to generate a measured temperature of the printhead assembly;

a memory device configured to store a thermal response model of the printhead assembly and an ejection history of the ejection elements; and

a controller configured to estimate an actual temperature of the printhead assembly based on the measured temperature of the printhead assembly, the thermal response model of the printhead assembly, and the ejection history of the ejection elements,

wherein the ejection history of the ejection elements identifies whether the ejection elements have been fired and whether the ejection elements have not been fired, and wherein the thermal response model of the printhead assembly includes a first set of parameters when the ejection elements have been fired and a second set of parameters when the ejection elements have not been fired.

¹ See generally Specification 15:2-26.

The Examiner relies on the following prior art references to show unpatentability:

Smith	US 4,791,435	Dec. 13, 1988
Prakash	US 6,302,507 B1	Oct. 16, 2001

The Examiner's rejections are as follows:

1. Claims 3, 24, 27, and 31 are rejected under 35 U.S.C. § 102(b) as being anticipated by Smith.
2. Claims 4-11, 21, 22, 25, 28, 30, and 32 are rejected under 35 U.S.C. § 103(a) as unpatentable over Smith in view of Prakash.

Rather than repeat the arguments of Appellants or the Examiner, we refer to the Briefs and the Answer for their respective details. In this decision, we have considered only those arguments actually made by Appellants. Arguments which Appellants could have made but chose not to make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

The Examiner has indicated how the claimed invention is deemed to be fully met by the disclosure of Smith (Answer 3-4). Regarding the independent claims, Appellants argue that Smith does not disclose estimating an actual temperature of the printhead assembly based on (1) a measured or current operating temperature of the printhead assembly; (2) a thermal response model of the printhead assembly; and (3) an ejection history of the ejection elements, wherein the thermal response model includes (a) a first set of parameters when the ejection elements have been fired, and (b) a second set of parameters when the ejection elements have not been fired as claimed (Br. 7, 10; Reply Br. 3).

Appellants argue that Smith is directed to compensating and controlling the temperature of the printhead or pen. Although Appellants note that Smith estimates the printhead temperature to ultimately control its temperature, this estimation is based solely on the temperature sensors--not the three enumerated elements that estimate the printhead assembly's temperature as claimed. In this regard, Appellants argue that the use profile described in Smith is not used to estimate the printhead temperature, but rather to control printhead temperature and maintain uniformity in the ink drops (Br. 6-8; Reply Br. 2-3).

The Examiner argues that Smith uses the measured/current temperature (thermistor output) in conjunction with thermal models (thermal response) that is compared with the nozzle profile (ejection history) to control the printhead temperature. Regarding the thermal model, the Examiner notes that Smith's uses two parameters that are directly affected by the use profile of the nozzle (i.e., whether the ejection elements have been fired or not). According to the Examiner, at low printhead temperatures, the nozzle has not been fired or has been unused for a period of time. At high temperatures, however, the Examiner notes that the nozzle has been fired or used frequently.

For the reasons that follow, we affirm.

ISSUES

(1) Have Appellants established that the Examiner erred in finding that Smith estimates an actual temperature of the printhead assembly based on (1) a measured or current operating temperature of the printhead

assembly; (2) a thermal response model of the printhead assembly; and (3) an ejection history of the ejection elements as claimed?

(2) Have Appellants successfully rebutted the Examiner's prima facie case of obviousness for claims 4-11, 21, 22, 25, 28, 30, and 32?

FINDINGS OF FACT

At the outset, we note that the Examiner's findings regarding the specific teachings of the cited references (Answer 3-6) are not in dispute except with respect to the limitations of the independent claims noted above. Accordingly, we will adopt the Examiner's factual findings regarding the cited references as they pertain to the undisputed claim limitations.

Smith discloses a thermal inkjet printhead temperature control system that provides temperature compensation in part by measuring the temperature of the printhead. In one embodiment, a temperature sensor TS, such as a thermistor, is placed on the printhead. The output of the thermistor is connected to microprocessor 2 and is used to achieve "a close estimate" of the printhead temperature. The estimated temperature can, in turn, be used to control the printhead temperature (Smith, col. 4, ll. 32-52; col. 1, ll. 62-64; Figs. 1, 2A-2B). In addition, thermal models of the pens or printheads are used in conjunction with the temperature sensors as well as the nozzles' use profiles to provide information useful in controlling printhead temperature (Smith, col. 1, l. 64 - col. 2, l. 25; col. 4, ll. 52-63).

PRINCIPLES OF LAW

Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every

element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. *RCA Corp. v. Applied Digital Data Systems, Inc.*, 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984); *W.L. Gore and Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983).

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the Examiner must make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966). Furthermore, “‘there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness’ [H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR Int’l Co. v. Teleflex Inc.*, No. 04-1350, slip op. at 14 (U.S., Apr. 30, 2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

If the Examiner’s burden is met, the burden then shifts to the Appellants to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

ANALYSIS

The Anticipation Rejection

We first consider the Examiner's rejection of claims 3, 24, 27, and 31 under 35 U.S.C. § 102(b) as being anticipated by Smith. Regarding independent claims 24, 27, and 31, we agree with the Examiner that Smith reasonably teaches estimating an actual temperature of the printhead assembly based on (1) a measured or current operating temperature of the printhead assembly; (2) a thermal response model of the printhead assembly; and (3) an ejection history of the ejection elements as claimed. Moreover, we agree with the Examiner that Smith's thermal response model of the printhead assembly in effect includes parameters depending on whether the ejection elements have been fired or not been fired essentially for the reasons stated by the Examiner (Answer 7).

At the outset, we note that Smith expressly states that printhead temperature varies with the use profile of the printhead (Smith, col. 1, ll. 15-17); *see also id.*, at col. 1, ll. 43-48 ("Many things influence the temperature of the nozzle...[including] the amount of use a particular nozzle gets...").

Second, we note that controlling the temperature of a printhead involves estimating the actual temperature of the printhead. This temperature estimation, however, is necessarily based on all three claimed factors as will be explained below.

Smith teaches that the output of the thermistor is used to achieve "a close estimate" of the printhead temperature (Smith, col. 1, ll. 62-64; Figs. 1, 2A-2B). Smith further teaches that thermal models of the pens or printheads are used in conjunction with the temperature sensors as well as the nozzles'

use profiles to provide information useful in controlling printhead temperature (Smith, col. 1, l. 64 - col. 2, l. 2).

In short, the thermistor's output in Smith (i.e., the signal used to "closely estimate" the printhead temperature) depends on, among other things, the ejection history of the ejection elements and whether the ejection elements have been fired. This detected temperature is inputted to microprocessor 2 which accounts for these and other factors to control the printhead temperature. This controlled temperature, in turn, is detected by the thermistor and sent to the microprocessor.

Even if we assume, without deciding, that Smith's controller is configured to estimate the actual printhead temperature solely on the basis measured temperature of the printhead, that measured temperature, however, is based at least in part on the other two recited factors--namely, the thermal response model and the ejection history. That is, both the thermal response model and the ejection history in Smith are *substantial factors* in determining the temperature sensor's output signal. As key aspects of Smith's temperature control system, the thermal response model and the ejection history directly contribute to controlling the printhead's temperature--and therefore the temperature detected by the sensor. The sensor's output signal, in turn, is used to estimate the temperature to ultimately control the temperature.

Simply put, estimating the actual temperature of the printhead assembly in Smith's temperature feedback control system necessarily is based at least in part on all three recited factors: (1) the measured or current operating temperature of the printhead assembly; (2) a thermal response

model of the printhead assembly; and (3) an ejection history of the ejection elements.

For at least these reasons, Smith fully meets independent claims 24, 27, and 31. Since Appellants have not separately argued the patentability of dependent claim 3, it falls with independent claim 24. *See In re Nielson*, 816 F.2d 1567, 1572, 2 USPQ2d 1525, 1528 (Fed. Cir. 1987); *see also* 37 C.F.R. § 41.37(c)(1)(vii).

The Obviousness Rejection

We next consider the Examiner's rejection of Claims 4-11, 21, 22, 25, 28, 30, and 32 under 35 U.S.C. § 103(a) as unpatentable over Smith in view of Prakash. Based on the record before us, we find that the Examiner has established at least a prima facie case of obviousness of those claims that Appellants have not persuasively rebutted. Specifically, the Examiner has (1) pointed out the teachings of Smith, (2) noted the perceived differences between Smith and the claimed invention, and (3) reasonably indicated how and why the reference would have been modified by the teachings of Prakesh to arrive at the claimed invention (Answer 4-6). Once the Examiner has satisfied the burden of presenting a prima facie case of obviousness, the burden then shifts to Appellants to present evidence or arguments that persuasively rebut the Examiner's prima facie case.

Here, Appellants did not persuasively rebut the Examiner's prima facie case of obviousness, but merely noted that the addition of Prakash fails to cure the deficiencies of Smith in connection with independent claims 24, 27, and 31--namely estimating the actual temperature of the printhead based on the measured temperature, the thermal response model, and the ejection

history. For the reasons previously discussed, however, we find Smith amply discloses these limitations. The rejection is therefore sustained.

CONCLUSIONS OF LAW

On the record before us, Appellants have not established that the Examiner erred in finding that Smith estimates an actual temperature of the printhead assembly based on (1) a measured or current operating temperature of the printhead assembly; (2) a thermal response model of the printhead assembly; and (3) an ejection history of the ejection elements as claimed.

Moreover, Appellants have not rebutted the Examiner's prima facie case of obviousness for claims 4-11, 21, 22, 25, 28, 30, and 32.

DECISION

We have sustained the Examiner's rejections with respect to all claims on appeal. Therefore, the Examiner's decision rejecting claims 3-11, 21, 22, 24, 25, 27, 28, and 30-32 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

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Application 10/066,529

AFFIRMED

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